Reduplicated words and *templates* in Brazilian and European Portuguese

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Introduction

Within the Dynamic Systems Theory (DST) in the study of child language, variability, flexibility and asynchrony tend to occur in the developmental process (Thelen & Smith, 1994). Following this perspective, *templates* are explained within an emergentist account of phonological development (Kelso, 1995; Keren-Portnoy, Vihman, DePaolis, Bidgood, & McGillion, 2011; Larsen-Freeman & Cameron, 2008; Thelen & Smith, 1994). The dynamic perspective was introduced into mainstream psychology by the pioneers Ester Thelen and Linda Smith (1994) and, more recently, in linguistics studies. This new linguistic perspective stresses the continuity between the development of phonological structure and the development of all other structures in nature (Szreder, 2012). Furthermore, according to this view, there is instability in development as there are adjustments in the system due to the self-organization principle, which can be understood as a spontaneous pattern formation (Kelso, 1995).

Following the dynamic view, this study hypothesizes that *variability* will be observed in the data regarding the use of reduplicated words and *template* manifestation, because the phonological system is understood as an open, dynamic and unstable system (Szreder, 2012). In moments of instability, templates manifest due to the principle of self-organization. The system organizes itself due to its inherent ability to find patterns from different interactions. One such example of interaction is the one between child language and ambient language, which plays a role in the emergence of templates as late babbling and articulatory planning. As caregivers unconsciously modify their speech when talking to toddlers by using simpler grammatical structures (child-directed speech), they may influence the predominant template form used by the child in a particular moment. However, template formation is not an end in itself nor is it static, since its influence might not prevail for much time.

It is important to mention, thus, that self-organization appears as 'order emerging without hierarchical pre-planning, based on the structural and functional capacities of the system' (Davis & Bedore, 2013:134), and as a result of spontaneous pattern formation (Kelso, 1995). In an emergentist view, self-organization does not require a blueprint or cookbook (Davis & Bedore, 2013:156).

Within the perspective of whole word/templatic phonology, the whole word is understood as the organizing principle in early phonological development, not features or segments (Vihman & Croft, 2007; Vihman & Velleman, 2002). Also, this perspective claims that many unusual phonological substitutions tend to occur due to 'pattern force' (Macken, 1979). This 'pattern force' which controls some early word patterns is now understood as 'templates' (Vihman & Croft, 2007), i.e. systematic shapes that facilitate the expansion of the lexicon.

The whole word approach consists of an attempt to understand children's phonological development in itself and on its own terms (Ferguson & Farwell, 1975). Word templates are seen as child-specific word patterns and their effect is to make a lot of the child's words sound similar to each other (Keren-Portnoy et al., 2011). They are the child's responses to challenging target forms. Difficulties for the child emerge due to limitations on articulation, articulatory planning, memory, or biases. Therefore, idiosyncrasies give rise to individual differences in production. Moreover, individual templates may be similar to the target word (*selected forms*) or be distorted forms of the target word (*adapted forms*). Some examples of 'bizarre' forms in the acquisition of English as L1 have been reported previously (Waterson, 1971:179):

Child Production	**Target**
[ˈɲẽ.ɲẽ]/[ˈɲi.ɲi]	*finger*
[ˈɲẽ.ɲẽ]	*window*
[ˈɲã.ɲã]	*another*
[ˈɲã.ɲø]	*Randall*

However, templates are not considered a universal in child language development, as they are shaped by the balance between universal, language-specific, and individual child factors. As Vihman and Keren-Portnoy (2013) explain, these early word-forms derive from a combination of perceptual experience with the rhythm of the language being acquired, segmental sequences of the ambient language, production practice through babbling and item learning. Added to that, their manifestation is guided by the linguistic typology of the target language, children's limitations/idiosyncrasies on articulation, articulatory planning, memory, and biases/preferences. Moreover, the categorization of phones may occur through a dynamic self-organizing process as changes occur in the phonological system.

Templates are classified in two types: *selected,* when they are adult-like (a pattern which is already in the adult target word), or *adapted*, when there is a distortion of the target word (ibid).

Early reduplicated words

In his early work on child language, Jakobson (1971) observed that young children started with a basic CV syllable (though V and VC are also possible), in order to maximally contrast the speech sounds produced. During the early periods of speech production, these initial syllables might appear singly or be reduplicated (e.g., *papa* and *mama*), as described by the author:

> As to the order of these constituents, the sequence "consonant plus vowel" appears to be almost compulsory (...) During the babbling in the infant's development, many of the uttered syllables consist of a vocalic sound succeeded by a consonantal articulation. (...) The mama-papa terms, like the primary word units in infant language, do not comprise different consonants, and a disyllabic form usually reiterates one and the same consonant (Jakobson, 1971:215)

Studies such as conducted by Keren-Portnoy et al. (2011) propose that ambient language has influence in the shaping of templates, which could explain differences between languages (Vihman & Croft, 2007; Vihman & Velleman, 2002). Although phonological reduplication does not seem to be a bias in the acquisition of Germanic

languages (the reason why children who acquire a Germanic language do not tend to adapt words mainly towards a reduplicated pattern), there are several studies showing the phenomenon in the acquisition of English as a mother language (Fee & Ingram, 1982; Ferguson, 1983; Klein 2005; Schwartz, Leonard, L., Wilcox, M., & Folgen, 1980; Vihman *et al.*, 1985).

Reduplication consists in the production of two identical or partially identical syllables (total and partial reduplication) when there is a target form (Klein, 2005). The process has been described as a means to facilitate the initial pronunciation (Fee & Ingram, 1982; Ferguson, 1983; Klein, 2005; Schwartz et al., 1980; Vihman *et al.,* 1985), and as a process that bears some traces of babbling (Fee & Ingram, 1982). In a study on babbling and first words, Vihman *et al.* (1985: 397) hold that babbling and first words share the following aspects: distribution of consonants, vocalization length and phonotactic structure.

If reduplication carries traces of babbling, some patterns from babbling are supposed to be found in the reduplicated words, which can be segmental or prosodic. According to MacNeilage (1999), some segmental characteristics found in babbling from 7 to 12 months can be considered universal, for instance, the segments [t, d, n, j] occur with anterior vowels, [k, g, ŋ] with back vowels, and [p, b, m] with central vowels. The author, who follows the *Frame-then-Content* theory, explains such preferred combination patterns as '(…) the tendency of the infant tongue to not move large distances in short periods of time' (p.314). This combination of sounds seems to be composed by segments from the same natural class, i.e. [t, d, n, j] and anterior vowels are coronal segments, [k, g, ŋ] and back vowels are dorsal segments, but the combination of labial consonants [p, b, m] with dorsal vowel (central vowel) is an exception for showing segments from different natural classes together. These three natural classes are presented by Clements and Hume (1995) in their work on the internal organization of segments, which states that the basic units of phonological representation are not segments but features (Clements & Hume, 1995:245). The natural classes are then organized and can be defined in terms of a single grouping of features. The classes were proposed, thus, through the observation of phonological/phonetic processes that apply to specific groups of segments that share the same features. The parallel between what is observed in babbling and initial reduplicated words raises the hypothesis that the combination of CV tends to occur with segments from the same natural class.

Based on the spontaneous speech productions of 5 European Portuguese (EP) speaking children, Correia (2009) suggested that productions with filler sounds at the left, and reduplications that are iambic are highly frequent in EP early words. In the Portuguese-speaking children's productions we observe reduplicated words that were themselves reduplicated in the adult speech (e.g., *mama/mamãe* 'mommy', *babá*, 'nanny', etc.) or, alternatively, we can find words that were not reduplicated in the target but are reduplicated by the children (e.g., [kɔ.'kɔ] produced for *escola* 'school', [pa.'pa] produced for *sapato* 'shoe').

In this study, we investigate whether early frequent reduplications can be explained as a result of a template manifestation, being used as a means to expand the lexicon. Additionally, we claim that the template involves repetition and adaptation of the target, which shows that the child is aiming to match the target as a whole rather than to achieve a segment-by-segment match.

Method

This study investigates the emergence of early reduplicated words and phonological templates in the linguistic development of children acquiring Brazilian Portuguese (BP) and EP. To conduct this study, we considered a longitudinal spontaneous speech sample from 6 children (3 acquiring BP + 3 acquiring EP) between the ages of 0;9 and 2;0. For BP, we used the *corpus A aquisição do ritmo em Português Brasileiro – Processos de Ancoragem* (Santos, 2005; 2007). For EP, we used the 'CCF' corpus, from the *Acquisition of European Portuguese* databank (available in http://phonbank.talkbank.org/access/Romance/Portuguese/CCF.html). Children's speech was collected monthly in observational sessions of 30-45 minutes from both corpora. For the analysis, orthographic and IPA phonetic transcriptions were considered (with 90% inter-judge reliability – two judges; a dubious 10% were excluded). To distinguish reduplicated words from babbling, we adopted the criteria proposed by Vihman and McCune (1994), i.e. the context (mother identification) and the type of vocalization (correspondence with the target word) disambiguated the child's utterance as *word* or *babbling*. Dubious and unintelligible transcriptions and productions were disregarded from the analysis. For the template analysis, a phonological structure had to occur at least in 40% of the total number of tokens in each session to be considered a template. Table 1 summarizes the data analyzed.

Table 1. Data from Brazilian and Portuguese children analyzed

Child	Age	Total # of productions
BP1 (male/Sao Paulo) Brazilian	0;9 – 2;0 16 sessions/months	Words: 1975 tokens
BP2 (male/ Sao Paulo) Brazilian	0;9 – 2;0 16 sessions/months	Words: 697 tokens
BP3 (male/ Sao Paulo) Brazilian	0;10 – 2;0 15 sessions/months	Words: 939 tokens
EP1 (female/ Lisbon) Portuguese	0;10 – 1;8 10 sessions/months	Words: 394 tokens
EP2 (female/ Lisbon) Portuguese	0;11 – 1;3 4 sessions/months	Words: 557 tokens
EP3 (male/ Lisbon) Portuguese	1;3 – 1;9 4 sessions/months	Words: 492 tokens

Results

Brazilian Portuguese

We observed variability between the subjects, regarding the type of template and the frequency of reduplicated words. In addition, we observed that instances of use and disuse of templates vary from child to child.

Tables 2, 3 and 4 below show how each template (T) was distributed along the sessions for the three Brazilian children observed. The first transcription corresponds to the child's utterance, whereas the target appears in the second transcription.

We observe that the first child, BP1, uses templates for a reduced period of time when compared to his peers. BP1 uses templates until 1;4, whereas BP2 and BP3 use phonological patterns until 1;8 and 1;10, respectively. Full ($C_1V_1.'C_1V_1$) and partial ($C_1V_1.'C_1V_2$) reduplications are present all along the observational period, often simultaneously. Although the three children use reduplication as a production strategy, BP2 also uses V.'CV and 'V.CV words, BP1 and BP3 also use CV words as templates. Templates are in use and disuse as development proceeds. All Brazilian children, whose data were analyzed used, selected and adapted templates, and that is independent of target word size or shape.

Table 2. BP1's templates (BP)[1]

	0;10	0;11	1;2	1;3	1;4
T	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	CV	CV	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$

BP1: i. reduplication ($C_1V_1.'C_1V_1$ and $C_1V_1.'C_1V_2$) ii. CV

Child form / *Target form*
[ne'ne] *nenê* / [ne'ne] 'baby' (selected)
[po'po] *vovô* / [vo'vo] 'granddad' (selected)
[ka'ka] *galinha* / [ga'lĩɲɐ] 'hen' (adapted)
[ta'ta] *tchau* / [tʃaʊ] 'bye' (adapted)

Child form / *Target form* [pɛ]
pé / [pɛ] 'foot' (selected) [la]
lá / [la] 'there' (selected)
[da] *dado* / ['dadʊ] 'dice' (adapted)
[fo] *flor* / [floɾ] 'flower' (adapted)

Table 3. BP2's templates (BP)

	0;9	0;10	0;11	1;3	1;4	1;5	1;6	1;8
T	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$V_1.'CV_1$ $V_1.'CV_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$'V_1.CV_1$ $'V_1.CV_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_2$

BP2: i. reduplication ($C_1V_1.'C_1V_1$ and $C_1V_1.'C_1V_2$)
Child form / *Target form*
[$k^ho'k^ho$] *cocô*/ [ko'ko] 'poo' (selected)
[pa'pa] *sapato*/ [sa'patʊ] 'shoe' (adapted)

ii. 'V.CV
Child form / *Target form*
['esɪ] *esse* / ['esɪ] 'this' (selected)
['opa] *roupa* / ['hopɐ] 'clothes' (adapted)

iii. V.'CV
Child form / *Target form*
[a'ki] *aqui* / [a'ki] 'here' (selected)
[o'k^ho] *cocô* / [ko'ko] 'poo' (adapted)

As the tables show, all Brazilian children used reduplicated templates. Their reduplicated words prevailed when there was a reduplicated template operating. Nevertheless, we observed reduplicated words in sessions in which the operating template had not a reduplicated shape as in BP2's 1;4 session.

[1] Tables show only the sessions in which *templates* were found.

Table 4. BP3's templates (BP)

	0;11	1;1	1;2	1;3	1;4	1;5	1;6
T	CV	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$'V_1.CV_1$ $'V_1.CV_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$

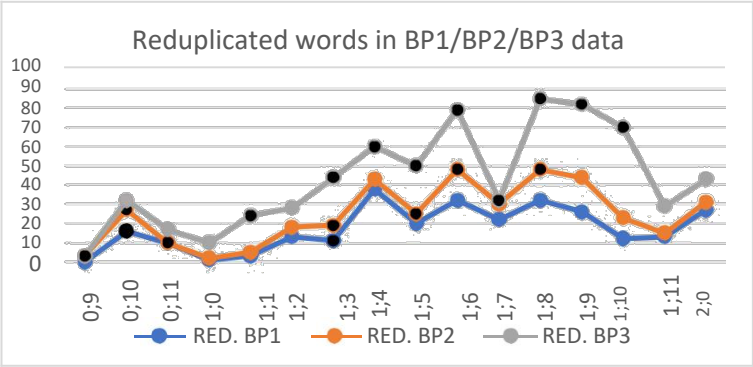
	1;7	1;8	1;9	1;10
T	$Cv_1V_1.'Cv_1V_1$ $Cv_1V_1.'Cv_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$

BP3: **i. reduplication ($C_1V_1.'C_1V_1$ and $C_1V_1.'C_1V_2$)**
Child form / Target form
[ma'mã] *mamãe* / [ma'mãĩ]'mother' (selected)
[po'po] *alô* / [a'lo] 'hello' (adapted)
iii. CV
Child form / Target form
[da] *dá* / [da] 'give me' (selected)
[k^ha] *caca* / ['kakɐ] 'poo/dirty thing' (adapted)

ii. 'V.CV
Child form / Target form
['uma] *uma* / ['ũmɐ] 'one' (selected)
['ɔk^hi] *óculos* / ['ɔkulʊs] 'glasses' (adapted)

The distribution of reduplicated words in Brazilian children data are presented in the following graphic (Figure 1). The black dots point out to the sessions in which there was a predominant reduplicated template*:*

Figure 1: reduplicated words in Brazilian data



Although BP1, BP2 and BP3 produced reduplicated words, the frequency of their reduplicated productions was not the same. BP3 was the child who used more templates as a strategy to produce lexicon and, consequently, he produced more reduplication as his favourite template was a reduplicated one.

European Portuguese

As in the BP data, we observed variability between the EP-speaking subjects regarding the type of template, as well as the instances of use and disuse of templates.

The following tables (Tables 5-7) show how each template (T) was distributed along the sessions for the three Portuguese children observed.

Table 5. EP1's templates (EP)

	1;0	1;2	1;5
T	$V_1.'CV_1$ $C_1V_1.'C_1V_1$ $C_1V_1.'C_1V_2$	$V_1.'CV_1$ $V_1.'CV_2$	$V_1.'CV_2$

EP1: **i. V.CV**

Child form / *Target form*
[ɐ.ˈla] *olá* / [ɔˈla] 'hello' (selected)
[a.ˈβe] *bebé* / [bɛˈbɛ] 'baby' (adapted)
[ɐˈpe] *pinguim* / [pĩˈg^{w}ĩ] 'penguin'(adapted)
[ɐˈkɐ] *cão* [kɐ̃w̃] / 'dog'(adapted)

ii. reduplication ($C_1V_1.'C_1V_1$ and $C_1V_1.'C_1V_2$)
Child form / *Target form*
[βɨˈβe] *bebé* / [bɛˈbɛ] 'baby' (selected)
[tɐˈta] *está* / [ʃˈta] 'it is' (adapted)
[paˈpa] *papa* / [pɐˈpa] 'daddy' (selected)

Table 6. EP2's templates (EP)

	1;0	1;1	1;3
T	CV	$'C_1V_1.'C_1V_1$	CV

EP2: **i. CV**
Child form / *Target form*
[mẽ]*mama* / [mɐˈmẽ] 'mommy'(adapted)
[ɲːe] *Inês* / [iˈneʃ] 'name' (adapted)
[tɔ] *toma* / [ˈtɔmɐ] 'take it' (adapted)
[da] *dá* / [da] 'give me' (selected)
[ʁɘ] *carro* / [ˈkaʁu] 'car' (adapted)

ii. reduplication ($'C_1V_1.'C_1V_1$)
Child form / *Target form*
['mɐˈmẽ] mamã / [mɐˈmẽ]*mother* (selected)
['ɲɐˈɲɐ] não / ['nɐ̃w̃*no* (adapted)]

Table 7. EP3's templates (EP)

	1;3	1;6	1;8
T	CV	$C_1V_1.'C_1V_1$ CV	$C_1V_1.'C_1V_2$ CV

EP3: **i. CV**
Child form / *Target form*
[pa] papá / [pɐˈpa] *daddy* (adapted)
[dɑ] dá / [da] *give me* (selected)
[βo] bola / ['bɔlɐ] *ball* (adapted)

ii. reduplication ($C_1V_1.'C_1V_1$ and $C_1V_1.'C_1V_2$)
Child form / *Target form*
[mɐˈmẽ] mama / [mɐˈmẽ]*mommy* (selected)
[dɐˈdɐ] dá / [da] *give me* (adapted)

Like Brazilian children, Portuguese children use reduplication as a production strategy. However, differences are observed between the children speaking the two varieties, as Portuguese children seem to use templates to a much lesser extent and for a smaller period of time. EP1 and EP3 use templates until 1;5 and 1;8, respectively, but EP2 abandons phonological patterns very early on (1;3). In Portuguese children, full and

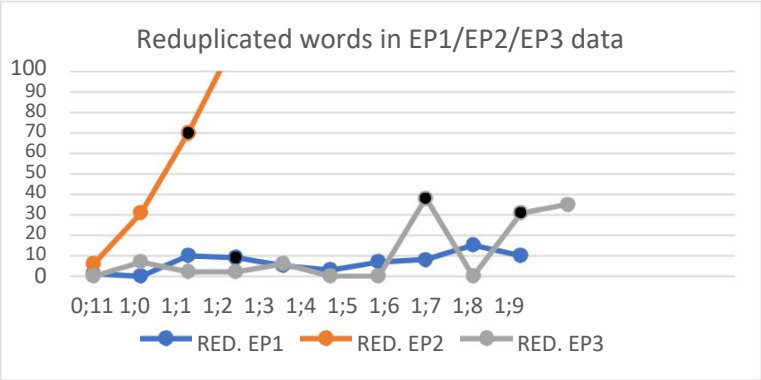
partial reduplication may co-occur (as in EP1), or they can alternate (as in EP3). In addition to reduplication, which is a production strategy common to the Portuguese children observed, V.'CV (in EP1's case) and CV (in EP2 and EP3's case) are also available strategies.

As observed in the Brazilian children, Portuguese children, whose data were analyzed, used selected and adapted templates, and that is independent of word size or word shape.

These preliminary results suggest that there are templates operating in the variability during phonological development. Not all children go through the same developmental path since variability and instability are inherent to development.

The distribution of reduplicated words in Portuguese children data are presented in Figure 2 below. The black dots point out to the sessions in which there was a predominant reduplicated template.

Figure 2: Reduplicated words in Portuguese data



As EP results show, there were sessions in which reduplication was used as a frequent strategy although there was no quantitative evidence of a template operating.

General discussion

This paper investigated whether early reduplications in Portuguese linguistic development can be explained as a result of templates used to expand the lexicon. Our results showed that Brazilian and Portuguese children use reduplication in their early productions, although the shape and timing of the templates emerging may vary between the two varieties and within the same variety. Templates seem to be used a strategy to expand the lexicon, as shown previously for Portuguese. In BP, some examples of these bizarre forms emerge often as reduplicated syllables. Baia (2008) names these bizarre, adapted forms produced by a child: 'lexical creations', following Secco (1994). The same is observed in the acquisition of European Portuguese (Correia, 2010).

The productions illustrated (Table 8) show that the early speech of children speaking BP and EP is mainly characterized by a reduplicated iambic pattern, although Portuguese words have stress mainly in the penultimate syllable (Cintra, 1997).

Table 8. Child words in BP and EP acquisition

Brazilian Portuguese (Baia, 2010; 2013)				**European Portuguese** (Baia & Correia, 2016; Correia, 2010)			
Age	*Child production*	*Target*	*Gloss*	*Age*	*Child production*	*Target*	*Gloss*
1;1	[baˈba] [aʻbo]	*bola* ['bɔla]	'ball'	1;1	['pəˈbə] ['baˈbɐ]	*bebé* [bɛˈbɛ]	'baby'
1;3	[baˈba]			1;2	[aβɐˈβɛ] [ɐˈβɛβe]		
1;5	[baˈba] [bɔˈbɔ]			1;4	[ɐbɐˈbe] [ɛbeˈbe]		
1;7	[bɔˈbɔ] ['bɔ.ja]			1;7	[beˈbe]		
1;1	[ka.ˈka] [ka]	*Karine* [kaˈɾini]	'name of the child's sister'	1;1	['ɐ̃ːw]	*não* [nɐ̃w̃	'no'
1;3	[kaˈka]			1;2	[nɐˈnɐ̃w̃]		
1;5	[kaˈka]			1;4	[na] [nɐ̃w]		
1;7	[kaˈka] [kaˈi]			1;7	[nɐ̃w̃]		

Templates that emerge as reduplicated words may be adapted or selected, as shown in the following examples (Baia, 2013) (Table 9).

Table 9: Adapted words in BP

Age (months)	**Child Production**	**Adult Target**	**Gloss**
12	[kaˈka]	*galinha* [gaˈli ɲɐ]	'hen'
13	[baˈba]	*bola* ['bɔ͡lɐ]	'ball'
14	[taˈta]	*tchau* [tʃaw]	'bye'
15	[baˈba]	*barbie* ['baɾbje]	'barbie'

Table 10: Selected words in BP

Age (months)	**Child Production**	**Adult Target**	**Gloss**
11	[naˈna]	*nanar* [naˈnaɾ]	'to sleep'
14	[neˈne]	*nenê* [neˈne]	'baby'
15	[poˈpo]	*vovô* [voˈvo]	'grandfather'
16	[maˈmãj]	*mamãe* [maˈmɐ̃j̃]	'mother'

Table 11. Reduplicated words in EP acquisition (Correia, 2010)

Age (months)	**Child (Joana) Productions**	**Adult Target**	**Gloss**
14	[mɐ̃ˈmɐ̃]	*mamã* [mɐˈmɐ̃]	'mommy'
16	[bɛˈβiː]	*bebé* [bɛˈβɛ]	'baby'
21	[kɐˈkɛ]	*Raquel* [ʁɐˈkɛɬ]	'name'
	[paˈpa]	*padrinho* [pɐˈdɾiɲu]	'godfather'
Age (months)	**Child (Luma) Productions**	**Adult Target**	**Gloss**
13	[paˈpʰa]	*Hopla* ['ɔplɐ]	'name'
16	[daˈda]	*dá* [da]	'give me'
17	[nɐˈnɐ]	*banana* [bɐˈnɐnɐ]	'banana'
20	[paˈpa]	*bola* ['bɔlɐ]	'ball'

As the examples in Tables 9 and 10 show, total reduplication can be used as a strategy to produce new words. Correia (2010:116ss.) has also shown that, despite some between-children variability both in the segmental patterns and in the timing of use, there was an early predominance for reduplications in EP (Table 11).

For instance, EP2 was the child who used reduplicated forms the most; however, her productions did not follow a specific word shape (Table 12).

Table 12: reduplicated words in EP2 data

Age (months)	Child Productions	Adult Target	Gloss
13	['da'da'dæ] ['da'da] ['dɐːdɐ̯] [ɐ'da'da] ['ɐ'dɐ'dɐ'dɐ'dɐ'dɐ'dɐː] [ʔ'dɐ'dɐ] ['dɐ'dɐ'dɐ] ['dɐ'dɐ'da'da'da'da]	Dá [da]	*Give me*

Long reduplication patterns appear to carry traces of babbling as they are very idiosyncratic to this child, and progressively disappear from the child's speech, as the lexicon expands. In this study, this phonological strategy is understood as the result of template manifestation, if it is used as a routine to expand lexicon.

The results presented also showed variability between children speaking the same variety. We observe similar reduplication, deletion, and filler sound insertion strategies in the speech of Brazilian and Portuguese children. However, different word shapes are found, both within the same child and between children, across varieties. Portuguese children use templates to a lesser extent and for a smaller period of time, when compared to Brazilian children.

These results also support previous work on Portuguese early development, suggesting that babbling and early words do not show a preference for a specific segmental pattern, but instead show variability and random segmental combinations in phonological development (Baia & Peres, 2013).

In sum, whole-word phonology is a holistic approach that claims that in early phonological development the intention of producing a whole word prevails over a segment-oriented path. The model suggests that there are phonological routines (templates) behind the seemingly random distortions. When compared segment by segment with the target form, the child's production seems not to correspond to the adult form in any systematic way. The child uses a pattern (template), which tends to be unstable through the recording sessions as the path of development constantly faces auto-organization processes.

Final remarks

Data analysis showed that there are templates operating in the variability in phonological development. In general, frequent and recurring reduplicated words in BP and EP early data result from the manifestation of a template. However, reduplication can be used as an independent strategy, even when there is no template constraining

the word shape, as the European data demonstrated. In general, Brazilian children used more reduplication as templates, i.e. as a strategy to expand the lexicon. In moments of instability, these templates were formed due to the principle of *self-organisation*, namely the spontaneous formation of patterns. This occurs as the system organizes itself due to its inherent ability to find patterns from some type of interaction. In dynamic terms of development, it is noted that the order arises from the variability. Furthermore, there was instability in the phonological development of all children, as there were adjustments in the system due to the self-organisation principle. Therefore, variability appears as evidence of an open, dynamic, and unstable phonological system.

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